

Claims

1. An injection moulding device (1) for foamable materials (2) comprising
 - a plasticizing means (3) including, in succession, a feed section (4) for receiving therein the material (2) to be plasticized, a conversion zone (5) for plasticizing the material and an ejection zone (6) for discharging the plasticized and compacted material;
 - an apportioning means (7) for apportioning a foaming agent (8) to the plasticized and compacted material (2);
 - a mixer (9) for homogeneously mixing the foaming agent (8) and the plasticized and compacted material (2), and
 - a pressure chamber (10) for dissolving the admixed foaming agent (8) in the material (2), the material being adapted to be supplied from said pressure chamber via a throttle means (11) to a die (12), **characterized in that** the pressure chamber (10) is formed between two plungers (14, 15) which are adapted to be axially displaced, especially independently of one another, in the interior of a pressure cylinder (13).
2. An injection moulding device according to claim 1, **characterized in that** the plasticizing means (3) is an extruder.
3. An injection moulding device according to claim 1 or 2, **characterized in that** the apportioning means (7) and/or the mixer (9) and/or the pressure chamber (10) define a module (16) which is adapted to be secured to a discharge end (30) of the extruder (3) via a flange.
4. An injection moulding device according to at least one of the preceding claims, **characterized in that** the mixer (9) includes a mixing screw (18) which is supported in a substantially cylindrical mixing chamber (17).
5. An injection moulding device according to at least one of the preceding claims, **characterized in that** the mixing chamber (17) is connected to the pressure cylinder (13) via a

supply bore (19) which is adapted to be closed by at least one plunger (14, 15).

6. An injection moulding device according to at least one of the preceding claims, **characterized in that** the longitudinal axes (20, 21) of the mixing screw (18) and of the pressure cylinder (13) extend substantially parallel to one another.
7. An injection moulding device according to at least one of the preceding claims, **characterized in that** the pressure cylinder (13) is connected to the throttle means (11) displaced relative to the supply bore (19) when seen in the direction of the longitudinal axis (21) of the pressure cylinder (13).
8. An injection moulding device according to at least one of the preceding claims, **characterized in that** the throttle means (11) is substantially formed by an outlet bore (23) which opens into the interior of the pressure cylinder (13).
9. An injection moulding device according to at least one of the preceding claims, **characterized in that** the volume of the pressure chamber (10) can be varied by an adjustable distance (24) between the plungers (14, 15).
10. An injection moulding device according to at least one of the preceding claims, **characterized in that** the plungers (14, 15) are adapted to be displaced between an admitting position (25) connecting the pressure chamber (10) to the supply bore (19) and a discharge position (26) connecting the pressure chamber (10) to the outlet bore (23).
11. An injection moulding device according to at least one of the preceding claims, **characterized in that**, at the discharge position (26), the outlet bore (23) can variably be closed by a plunger (14) acting as a throttle plunger for determining a pressure relief rate.
12. An injection moulding device according to at least one of the preceding claims, **characterized in that**, at the discharge position (26), a plunger (15) acting as a pressure plunger is movable towards the throttle plunger (14) in a controlled manner so as to determine the injection rate into the die (12).

13. An injection moulding device according to at least one of the preceding claims, **characterized in that** at least one plunger (14, 15) is provided with a transverse bore (27) for feeding ungassed, plasticized material (2) to the outlet bore (23).
14. An injection moulding device according to at least one of the preceding claims, **characterized in that**, at a through-position (28) of the plunger (14, 15), the transverse bore (27) connects a bypass bore (29) to the outlet bore (23), said bypass bore (29) communicating with the plasticizing means (3).
15. An injection moulding device according to at least one of the preceding claims, **characterized in that**, at the through-position (28), the supply bore (19) is closed.
16. An injection moulding device according to at least one of the preceding claims, **characterized in that** an extruder antechamber (32) is formed in the extruder (3) between the discharge end (30) and an extruder screw (31).
17. An injection moulding device according to at least one of the preceding claims, **characterized in that** the extruder (3) is followed by a discharge bore (33) branching into a mixer bore (34), which extends towards the mixer (9), and the bypass bore (29).
18. An injection moulding device according to at least one of the preceding claims, **characterized in that** the foaming agent (8) is adapted to be fed to the mixer bore (34) by the apportioning means (7).
19. An injection moulding device according to at least one of the preceding claims, **characterized in that** the apportioning of the foaming agent (8) is controllable in dependence upon a feed rate of the extruder screw (31).
20. An injection moulding device according to at least one of the preceding claims, **characterized in that**, in dependence upon a desired diffusion pressure, at least one plunger (14, 15) can be moved away from the other plunger (15, 14) when the pressure chamber (10) is being filled with material.

21. An injection moulding device according to at least one of the preceding claims, **characterized in that** both plungers (14, 15) are displaceable synchronously in the direction of the throttle means (11) while maintaining the desired diffusion pressure.
22. An injection moulding device according to at least one of the preceding claims, **characterized in that** the module is a prefabricated module unit.